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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/766,105 | 01/28/2004 | Daniel Roy Solli | 9450 | 2184 |

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Bruce H. Johnsonbaugh
Eckhoff & Hoppe
333 Sacramento Street
San Francisco, CA 94111

EXAMINER

CHOI, WILLIAM C

ART UNIT PAPER NUMBER

2873

DATE MAILED: 03/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/766,105

Applicant(s)

SOLLI, DANIEL ROY



Examiner

William C. Choi

Art Unit

2873

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-7 and 13-15 is/are allowed.
- 6) ☒ Claim(s) 8, 10 and 12 is/are rejected.
- 7) ☒ Claim(s) 9 and 11 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Priority

Applicant's claim for domestic priority under 35 U.S.C. 119(e) is acknowledged.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 8, 10 and 12 are rejected under 35 U.S.C. 102() as being anticipated by Byer et al (U.S. 5,838,702).

In regard to claim 8, Byer et al discloses an apparatus for maximizing conversion efficiency in nonlinear optical mixing processes between incoming, polarized optical beams and output, polarized optical beams (column 7, lines 14-60, Figure 5 & 6) comprising: birefringent photonic crystal means composed of material with optical nonlinearity for achieving phase matching of said output beams with said incoming beams, wherein said birefringent photonic crystal means is adapted to reduce the wavevector mismatch Δk between said incoming and output beams to zero using said photonic crystal birefringence (column 7, lines 25-60).

Regarding claim 10, Byer et al discloses wherein said polarized input beam has frequency ω_1 and first wavevector k_1 , and said polarized output beam has frequency

$m\omega_1$ and second wavevector k_2 , wherein said photonic crystal is adapted to reduce the wavevector mismatch between said input and output beams to zero (column 7, lines 18-25 and 45-48).

Regarding claim 12, Byer et al discloses wherein said photonic crystal means is adapted to eliminate the walk-off of ordinary and extraordinary waves characteristic of phase matching with angle tuning (column 7, lines 49-56).

Allowable Subject Matter

Claims 1-7, and 13-15 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: The prior art fails to teach a combination of all the claimed features as presented in claims 1-7: an apparatus for controlling the polarization of an incident beam of electromagnetic radiation comprising photonic crystal means as claimed, specifically wherein said crystal means comprises a crystalline lattice having cells with a defined periodic geometry that produces a polarization-dependent band structure by interference between Bragg reflections from many material interfaces for electromagnetic radiation.

The prior art fails to teach a combination of all the claimed features as presented in claim 13: an optical apparatus for selectively changing a first known polarization of an incident beam to a second, predetermined polarization of an output beam comprising a photonic crystal means as claimed, specifically wherein said crystal means comprises a crystalline lattice having cells with a defined periodic geometry that produces a

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polarization-dependent band structure by interference between Bragg reflections from many material interfaces for electromagnetic radiation.

The prior art fails to teach a combination of all the claimed features as presented in claim 14: a method of converting the polarization of an incoming beam of light from a first, known polarization to a second, selected polarization as claimed, specifically comprising the steps of causing an incoming beam to enter a photonic crystal wherein said photonic crystal is adapted to convert a first to a second polarization, and causing said second selected polarization beam to either be transmitted through or reflected off of said photonic crystal.

The prior art fails to teach a combination of all the claimed features as presented in claim 15: an optical apparatus for creating a delay line arising from a transfer of energy between two different polarizations of electromagnetic waves as claimed, specifically wherein either a delayed or advanced transmitted electromagnetic waveform or wavepacket results by adjusting either the relative angular orientations of said birefringent crystal means, said polarizer means, or said incident EM wave polarization.

Claims 9 and 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art fails to teach a combination of all the claimed features as presented in claim 9: an apparatus for maximizing conversion efficiency in nonlinear optical mixing processes comprising birefringent photonic crystal means as claimed, specifically

wherein said photonic crystal means is adapted to achieve phase matching with minimal use of angle or temperature tuning.

The prior art fails to teach a combination of all the claimed features as presented in claim 11: an apparatus for maximizing conversion efficiency in nonlinear optical mixing processes comprising birefringent photonic crystal means as claimed, specifically wherein said photonic crystal means is composed of material that is not necessarily intrinsically birefringent.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Filkins et al (U.S. 6,710,912 B1) is being cited herein to show a photonic crystal apparatus comprising some of the structural limitations of that of the claimed invention, but does not specifically disclose incident beam polarization control as claimed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William C. Choi whose telephone number is (571) 272-2324. The examiner can normally be reached on Monday-Friday from about 9:00 am to 6 pm.

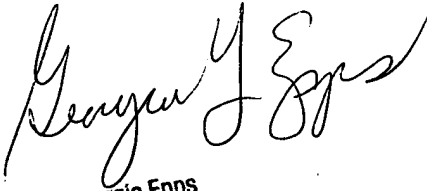
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Y. Epps can be reached on (571) 272-2328. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

W.C

William Choi
Patent Examiner
Art Unit 2873
March 18, 2005


Georgia Epps
Supervisory Patent Examiner
Technology Center 2800